"Miller, Robert"
<RoMiller@asarco.com>
10/30/2007 01:45 PM

To Linda Jacobson/ENF/R8/USEPA/US@EPA
cc "Nickel, Jon" <JNickel@asarco.com>
bcc
Subject RE: GW Fact Sheet, Selenium Speciation Results, Effectiveness of Slurry Wall at Former APSD, Residential Well Sampling Results

Linda, attached is a write-up and associated figures for a "fact sheet" for groundwater at East Helena. Please feel free to call me to discuss, or if you would like help in reproduction.

Bob.

-----Original Message-----
From: Jacobson.Linda@epamail.epa.gov
[mailto:Jacobson.Linda@epamail.epa.gov]
Sent: Tuesday, October 02, 2007 3:59 PM
To: Miller, Robert
Cc: Nickel, Jon; Breeden.Randy@epamail.epa.gov
Subject: GW Fact Sheet, Selenium Speciation Results, Effectiveness of Slurry Wall at Former APSD, Residential Well Sampling Results

Would you please provide me an update on the following items: 1) the groundwater fact sheet, 2) the results of the selenium speciation to date--how is the SOP working, 3) the effectiveness of the slurry wall at the former APSD--based on groundwater levels and monitoring data, 4) the results of all of the annual residential well sampling events.

Would you mind putting together for me all sediment data that you have on Lower Lake, Upper Lake and Prickly Pear Creek in an electronic file? For Prickly Pear Creek, if sediment was collected, from what depths were samples taken?

Thank you.

Linda Jacobson

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ASARCO EAST HELENA SMELTER
GROUNDWATER MONITORING RESULT FACT SHEET

1.0 INTRODUCTION

In January 1998, the United States Environmental Protection Agency (EPA) and ASARCO LLC (Asarco) entered into a Consent Decree (CV 98-3-H-CCL) under the Resource Conservation and Recovery Act (RCRA) that required Asarco to investigate and correct releases of arsenic and metals in groundwater and soils at the East Helena Smelter. As part of this Decree, Asarco has completed several investigations and prepared several site investigation documents including:

- RCRA Current Conditions/Release Assessment (CC/RA) (Hydrometrics 1999a).
- Interim Measures Work Plan, East Helena Facility (Hydrometrics, 1999b).
- RCRA Facility Investigation (RFI) Work Plan (Hydrometrics, 2000a)
- Phase I RCRA Facility Investigation Report (Asarco Consulting Inc. (ACI) 2003, revised 2005).

On October 4, 2005, Asarco received a letter from EPA that summarized EPA's decision to defer development of the Phase II RCRA RFI Work Plan, and instead focus on evaluation of additional interim measures that address groundwater. During April 25-26, 2006, Asarco, EPA, and the Montana Department of Environmental Quality (MDEQ), met at EPA offices in Denver in a working session to evaluate existing site conditions and outline a strategy for groundwater remedial measures at the site. MDEQ's participation addressed the need for coordination of plant facility cleanup activities associated with a State of Montana Consent Decree (CDV-2004-212) with Asarco.

Based on earlier meetings between Asarco, EPA and MDEQ in March 2006, it was recognized that Montana Consent Decree activities that consist primarily of process unit cleanup and building demolition would require coordination with any groundwater corrective actions implemented as part of the RCRA program. In addition, a key component of facility process unit material removal and associated site demolition is the construction of a CAMU Phase 2 cell. This project also requires coordination between all parties.

2.0 MONITORING PROGRAM

Groundwater and surface water has been monitored at the East Helena Plant Site Area since 1984 as part of the CERCLA and RCRA programs. The monitoring program includes sampling of water supply wells including residential wells, municipal wells and industrial water supply wells. The current monitoring program includes sampling of 119 monitoring wells, water level measurement in 132 monitoring wells, and surface water sample collection from 6 sites in Prickly Pear Creek. Water supply sample sites are shown on Figure 1. Monitoring well and surface water sample locations are shown on Figure 2. Figure 3 shows a cross-section of the aquifers monitored at the smelter site and in the city of East Helena. In 2007, arsenic and selenium concentrations were the focus of the monitoring programs.

3.0 WATER SUPPLY SAMPLE RESULTS

Based on the spring 2007 sampling campaign, water supply monitoring showed:

- All sampled downgradient residential drinking water well and municipal drinking water well arsenic concentrations are less than the Montana and EPA drinking water standards of 0.01ppm.
- One down-gradient residential irrigation well had a detectable arsenic concentration of 0.042 ppm.
- One residential drinking water well upgradient from the plant had a detectable arsenic concentration of 0.017 ppm. Although this is above the drinking water standard of 0.01 ppm, the presence of arsenic in this upgradient well is a result of naturally occurring arsenic from the strata the well is completed in.
- One downgradient residential irrigation well had a detectable selenium concentration of 0.34 ppm, which exceeds the drinking water standard of 0.05 ppm.
- The frequency of the sample program for four residential wells, located in the northwest area of the City of East Helena was increased to monthly, beginning September 2006. It is believed these

residential wells have the highest potential to show changing trends in arsenic concentrations, should they occur.

4.0 GROUNDWATER MONITORING WELL SAMPLE RESULTS

Monitoring results for groundwater flow, arsenic concentrations, and selenium concentrations are shown in Figures 4, 5, 6, 7 and 8. Based on the spring 2007 sampling campaign, monitoring well sample results showed:

- Groundwater flow is generally to the north and northwest (see Figure 4).
- Primary sources of groundwater recharge are Upper Lake, Lower Lake and, in some locations, (City of East Helena) Prickly Pear Creek.
- Groundwater in the plant site area has elevated concentrations of arsenic.
- Historic and existing source areas on the plant site have resulted in a shallow arsenic plume (see Figure 5), and a deeper intermediate arsenic plume (see Figure 6).
- Primary remaining sources of arsenic in groundwater are the Speiss-Dross Area, and the Former Acid Plant Sediment Drying Area.
- The shallow aquifer arsenic plume is underlain by an intermediate aquifer arsenic plume that extends into the northwest portion of the City of East Helena.
- The width and extent of the intermediate aquifer plume is controlled by narrow coarse grained sand and gravel channel deposits.
- Most wells in the intermediate aquifer arsenic plume show arsenic concentrations that are seasonally variable, with no obvious trends of increasing or decreasing concentrations.
- Well EH-111, at the northwest edge of the plume, shows a generally increasing arsenic concentration trend.
- Elevated concentrations of selenium are present in the shallow and intermediate aquifers.
- Wells completed at the Northwest end of East Helena initially had arsenic concentrations below detectable limits, but now show detectable concentrations below Federal MCLs and State of Montana standards.
- The highest selenium concentrations occur in the City of East Helena, down-gradient of the plant site (see Figures 7 and 8).
- The source of elevated selenium concentrations in East Helena area groundwater is unknown, but is under on-going investigation.

5.0 SURFACE WATER MONITORING RESULTS

Surface water monitoring results showed:

- Since 1998, arsenic and metal concentrations are generally low (0.01 ppm or less).
- Since 1998, occasionally, arsenic and metal concentrations have become slightly elevated (up to 0.02 ppm) as a result of elevated turbidity associated with high runoff conditions.
- Historical water results (1984 to 1997), showed water arsenic concentrations have been higher (up to 0.04 ppm) than those observed in the last 9 years.
- Historically, elevated arsenic and metal concentrations in Prickly Pear Creek have been attributed to former contributions of arsenic levels from Lower Lake, a former process pond.
- The use of Lower Lake as a process pond was terminated in 1989. This process pond was replaced with above ground tanks.
- Lower Lake sediments that had elevated metals from its use as a process pond were removed in 1996. Both replacement of Lower Lake with tanks, and removal of its sediments resulted in present arsenic concentrations in Lower Lake that are similar to those now observed in Prickly Pear Creek.
- Since 1998, arsenic concentrations in Prickly Pear Creek upstream and downstream are below aquatic standards (0.015 ppm chronic and 0.034 acute), and typically range from 0.005 mg/l to 0.01 mg/l. Occasionally arsenic concentrations in Prickly Pear Creek have exceeded the human health standard for arsenic of 0.01 mg/l with highest concentrations measured since 1998 of 0.014 ppm.

6.0 PROPOSED INTERIM CORRECTIVE MEASURES FOR GROUNDWATER

EPA has expressed its preference for passive corrective measures to address groundwater at the East Helena site. These measures include *in situ* containment such as slurry walls and capping, and *in situ* treatment options such permeable barrier walls. As a result of discussions between EPA, Asarco, and MDEQ, groundwater corrective actions focus on three general areas:

1. The former acid plant sediment drying area (see Figure 9),
2. The former speiss/dross area (see Figure 9), and
3. The elevated groundwater arsenic plume down-gradient from these areas (see Figure 5 and 6.)

The former acid plant sediment drying area has been identified as a significant source area with high arsenic groundwater concentrations. The former speiss/dross area also has been identified as a significant source of elevated arsenic and metal concentrations in groundwater. The former speiss-dross area is the primary source of a relatively narrow, high concentration plume that extends from the East Helena Plant into the City of East Helena.

In the Summer of 2005, EPA constructed a 30-foot pilot test permeable reactive barrier (PRB) wall to evaluate the potential effectiveness of *in situ* treatment of the arsenic plume down-gradient of these source areas. Evaluation of the pilot PRB is on-going, with additional data expected to become available later in 2007.

As a result of the April 2006 meetings between EPA, Asarco, and MDEQ, the general strategy for groundwater corrective actions at the East Helena Facility is as follows:

- Slurry wall construction and capping of the former acid plant sediment drying area. The general trace of this proposed slurry wall is shown on Figure 10. This project was completed in fall 2006.
- Slurry wall construction and capping of the former speiss/dross area. The general trace of the proposed slurry wall is shown on Figure 10. This project is expected to be completed in the Fall of 2007.
- Construction of a PRB wall near the area of the present PRB test wall. The proposed wall location is shown on Figure 10.
- Potentially, construction of a second PRB wall northwest of East Helena. This PRB may be constructed if arsenic concentrations were to exceed drinking water standards in monitoring wells in this area (see Figure 6).

7.0 DESIGN AND CONSTRUCTION OF A SLURRY WALL AND CAP IN THE FORMER ACID PLANT SEDIMENT DRYING AND THE FORMER SPEISS DROSS AREA

Figure 11 shows the conceptual design of a slurry wall and temporary caps in the former acid plant sediment drying area and the former speiss-dross area.

7.1 SLURRY WALL DESIGN

The slurry walls in the former acid plant sediment drying area and former speiss-dross area are 3-foot thick walls composed of a mixture of bentonite slurry and soils. The walls extend from the surface through unsaturated and saturated alluvial sediments composed of permeable sand, silt, gravel and cobbles (see Detail 3, Figure 11). The objective of wall design and construction is to isolate groundwater and sediments that act as sources of elevated arsenic concentrations in downgradient groundwater. In general, the slurry wall design is as follows:

- The walls are 940 to 1300 feet long, 32 to 45 feet deep and 3 feet wide.
- The walls are keyed 2-feet into a low permeability volcanic ash-clay that underlies the alluvial sediments.
- Standard bentonite grout is used for slurry wall construction.

7.2 TEMPORARY CAP DESIGN

The purpose of the temporary cap is to inhibit infiltration from precipitation into sediments surrounded by the slurry wall. The conceptual design of a temporary cap is shown in Detail 1 in Figure 11. In general, from the top down, the temporary cap will consist of the following:

- Sand bags to anchor the temporary cover.
- A 24-mil reinforced polyethtylene (RPE). The seams in the RPE will be overlapped and sealed with a butyl rubber seaming tape and or sewed.
- A minimum 10 ounce non-woven geotextile,
- A prepared sub-grade consisting of source soils from the excavation trench and/or fine-grained slag fill for grading purposes.
- Existing soils

Figure 1.

Water Supply Well Sampling Locations

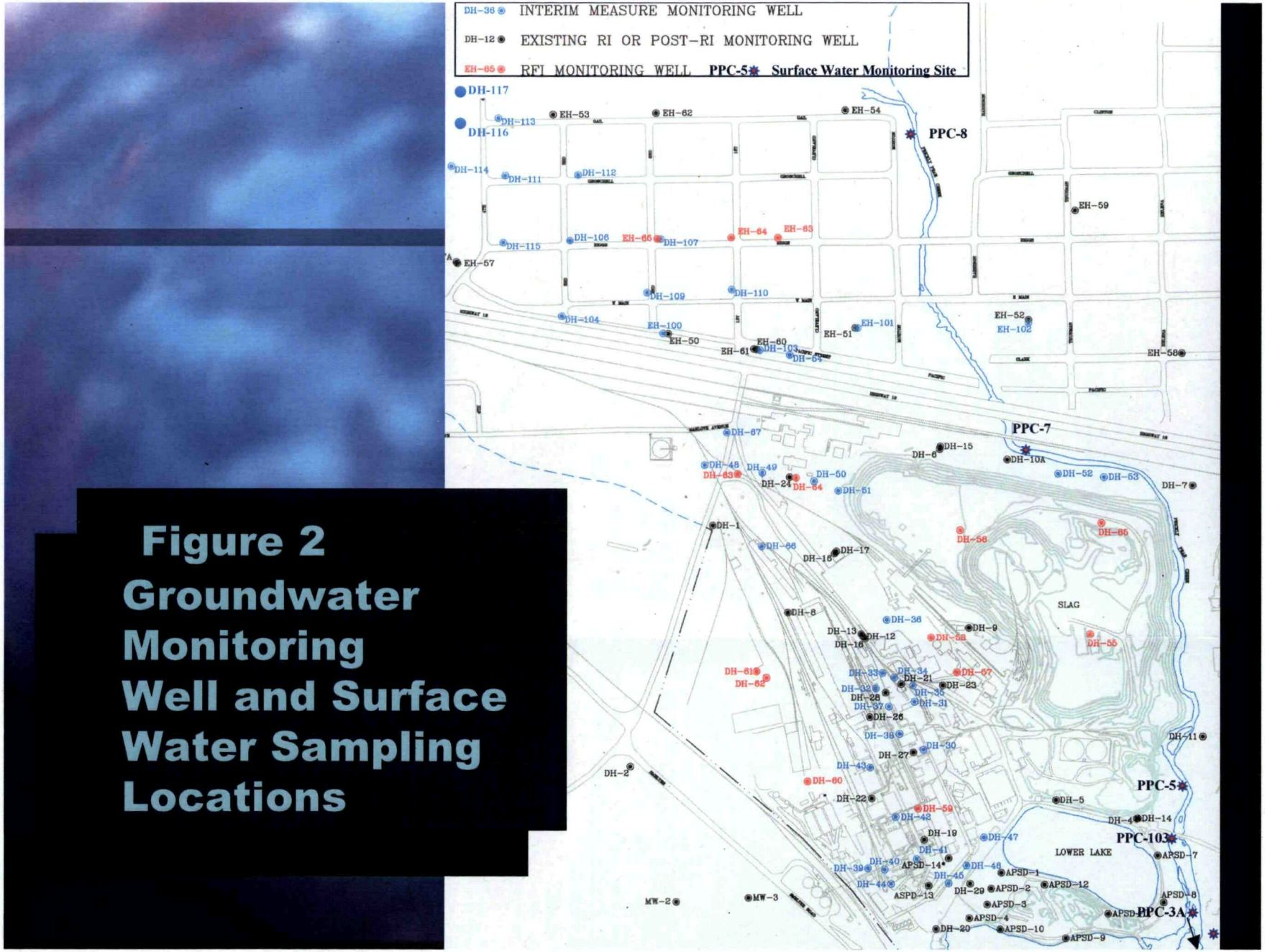


Figure 2
Groundwater Monitoring Well and Surface Water Sampling Locations

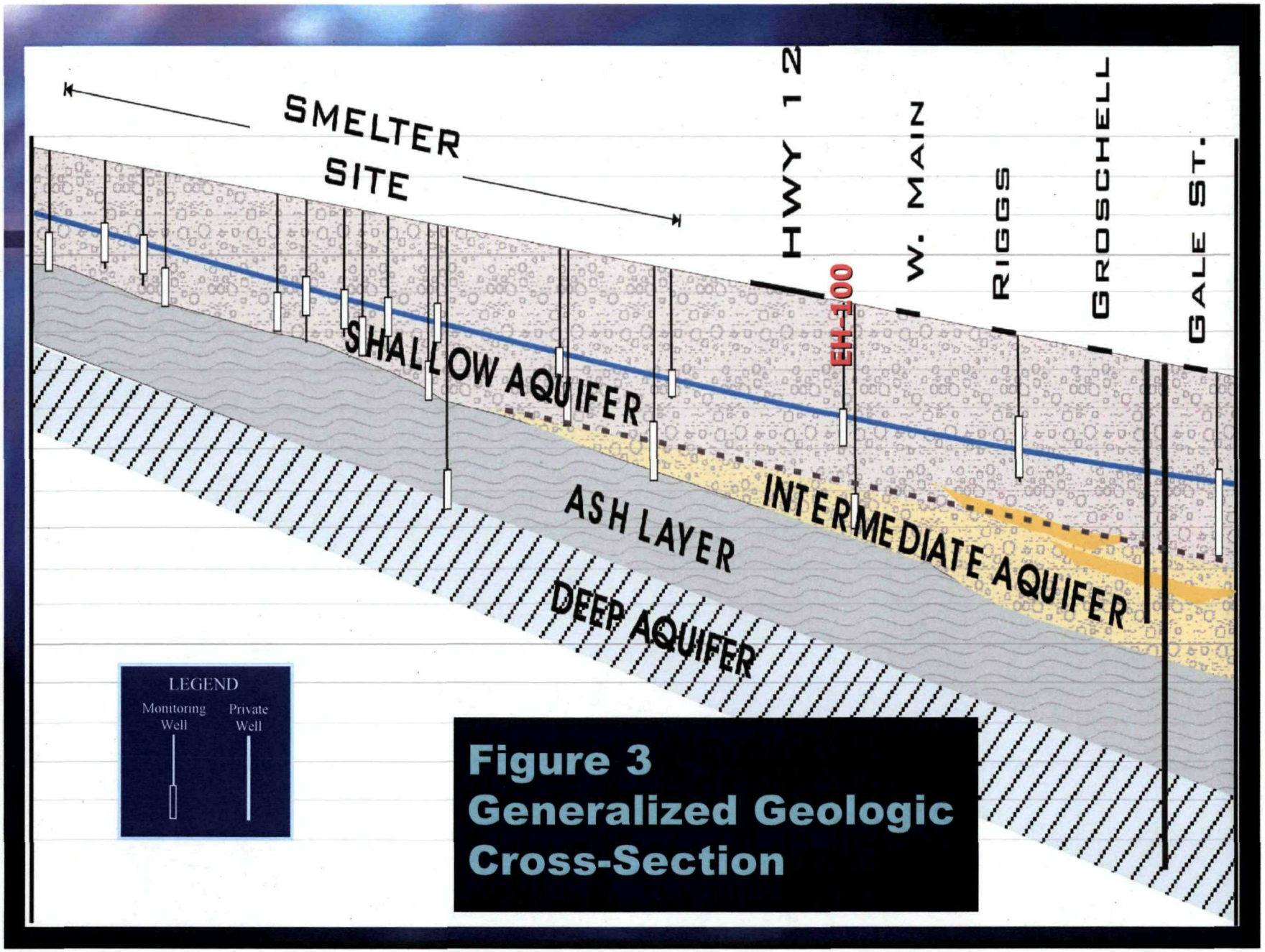


Figure 3
Generalized Geologic Cross-Section

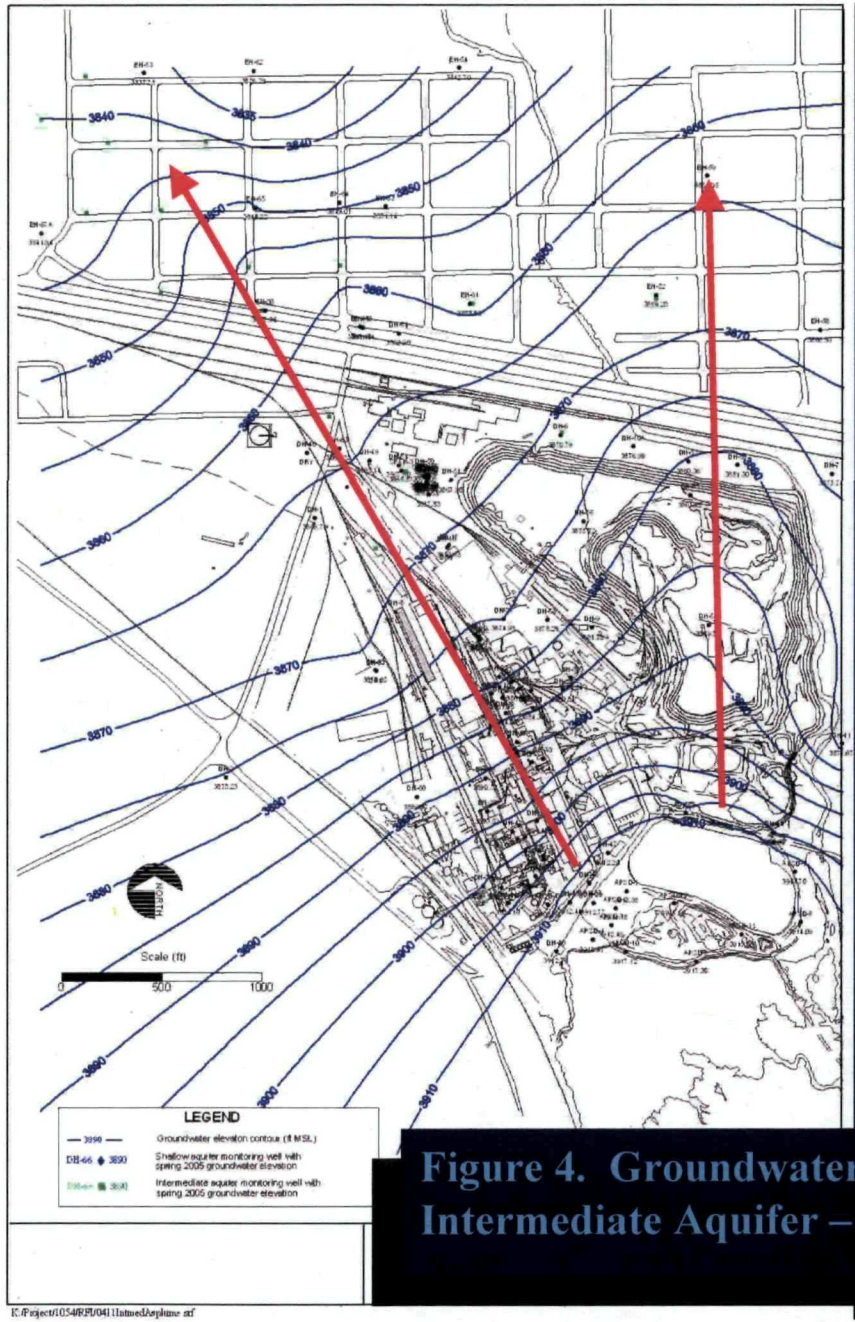


Figure 4. Groundwater Flow Shallow and Intermediate Aquifer – Spring 2007

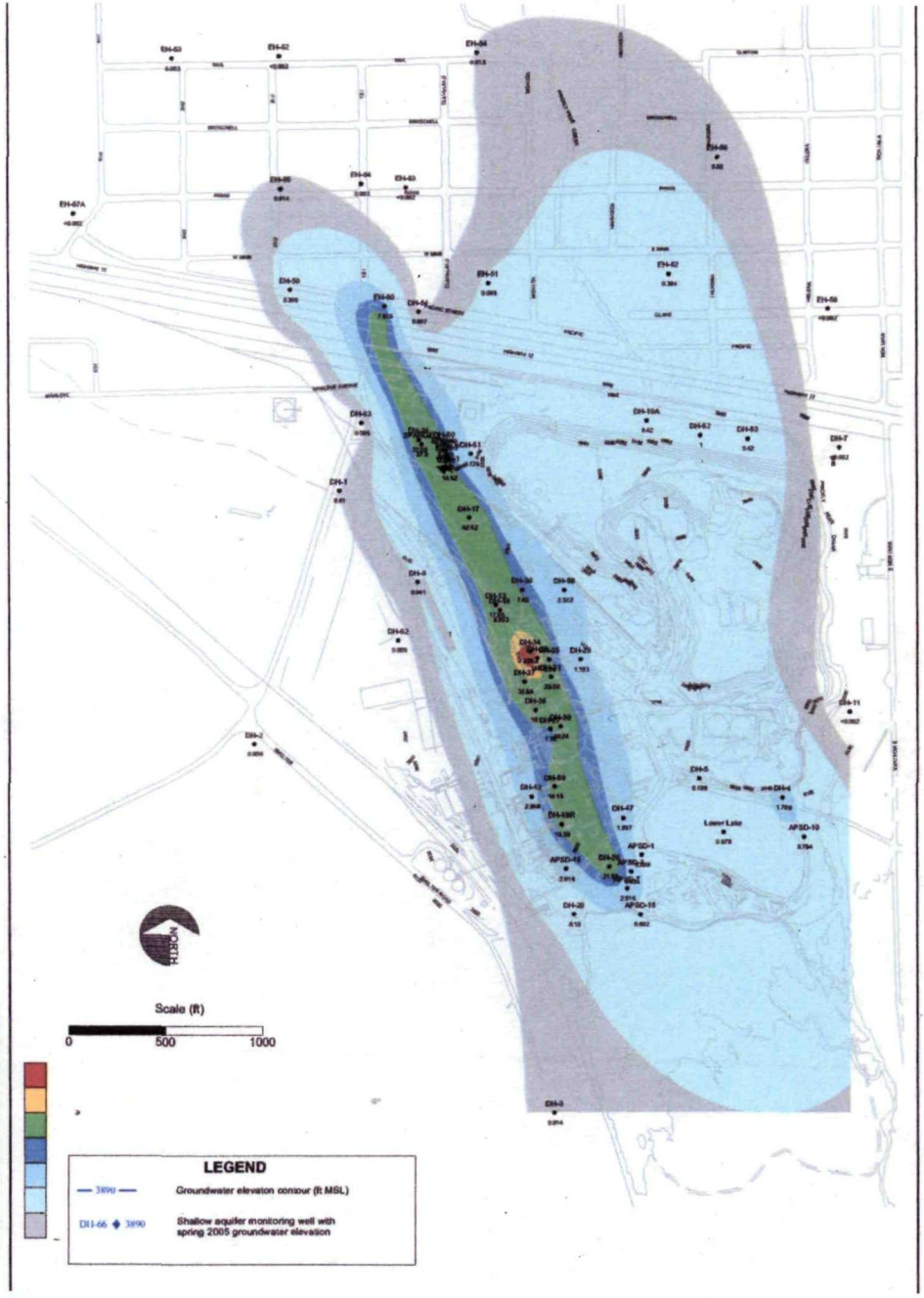


Figure 5. Arsenic Concentrations – Shallow Aquifer – Spring 2007

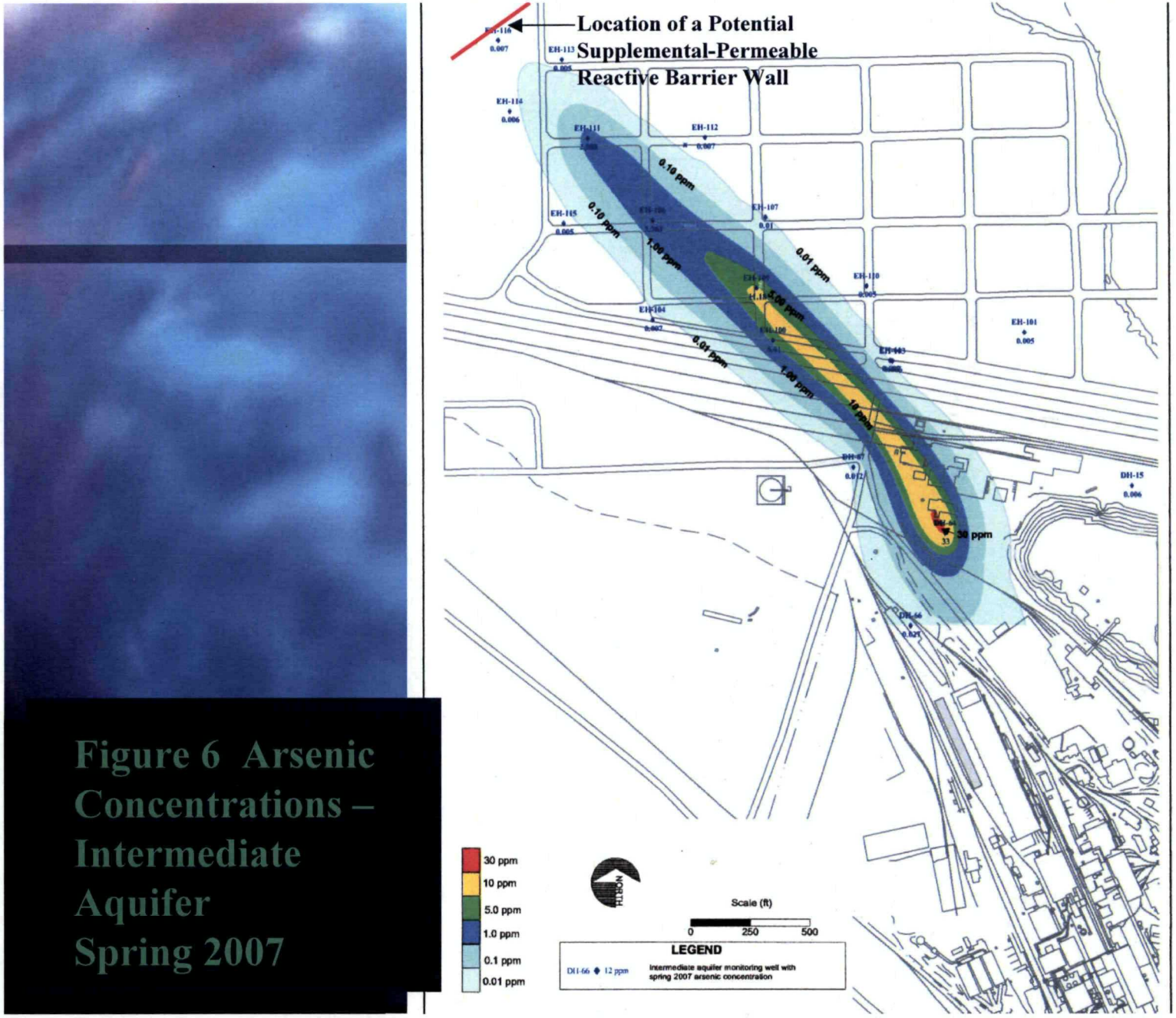
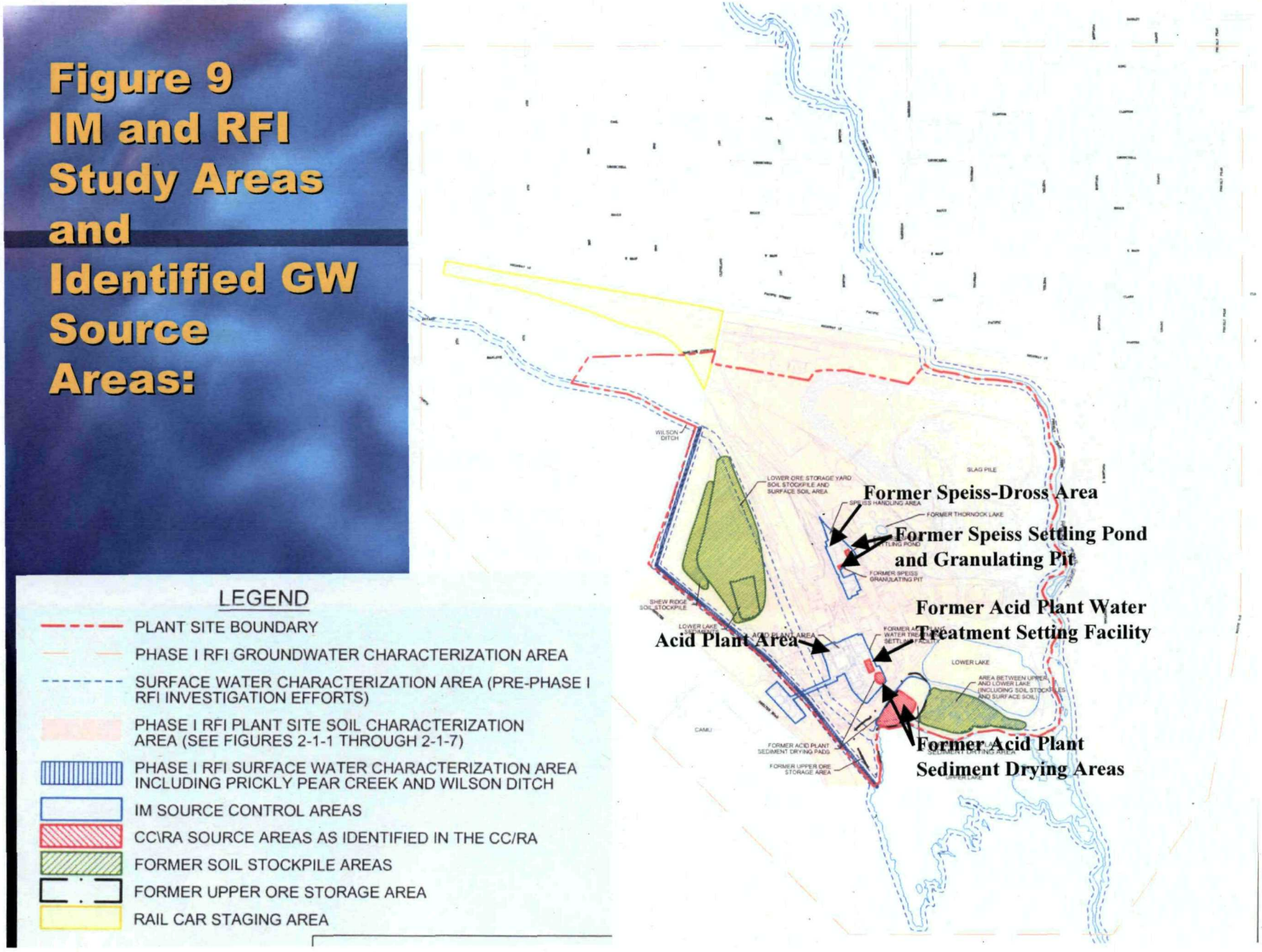


Figure 6 Arsenic Concentrations – Intermediate Aquifer Spring 2007

Figure 9
IM and RFI Study Areas and Identified GW Source Areas:



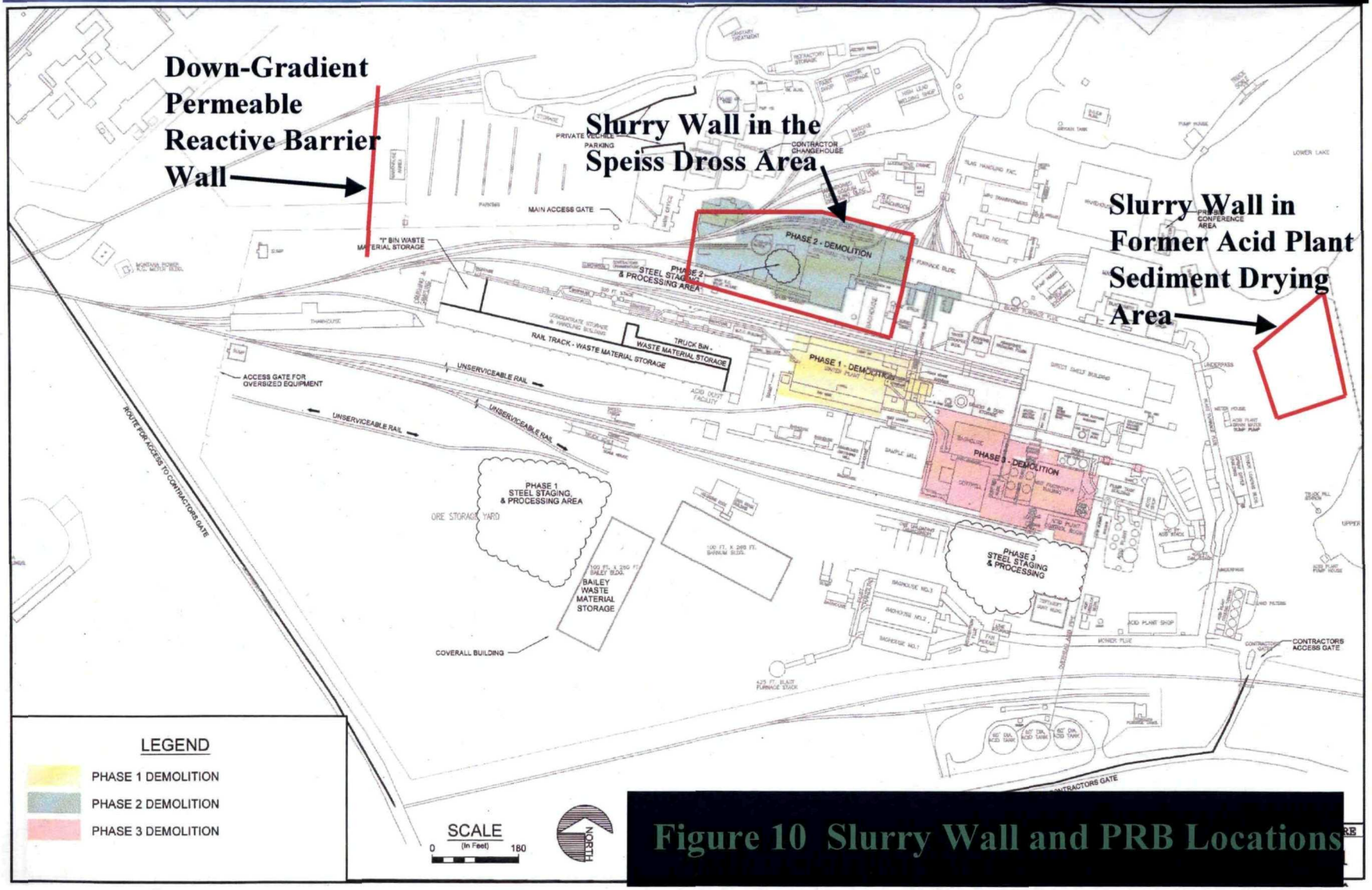
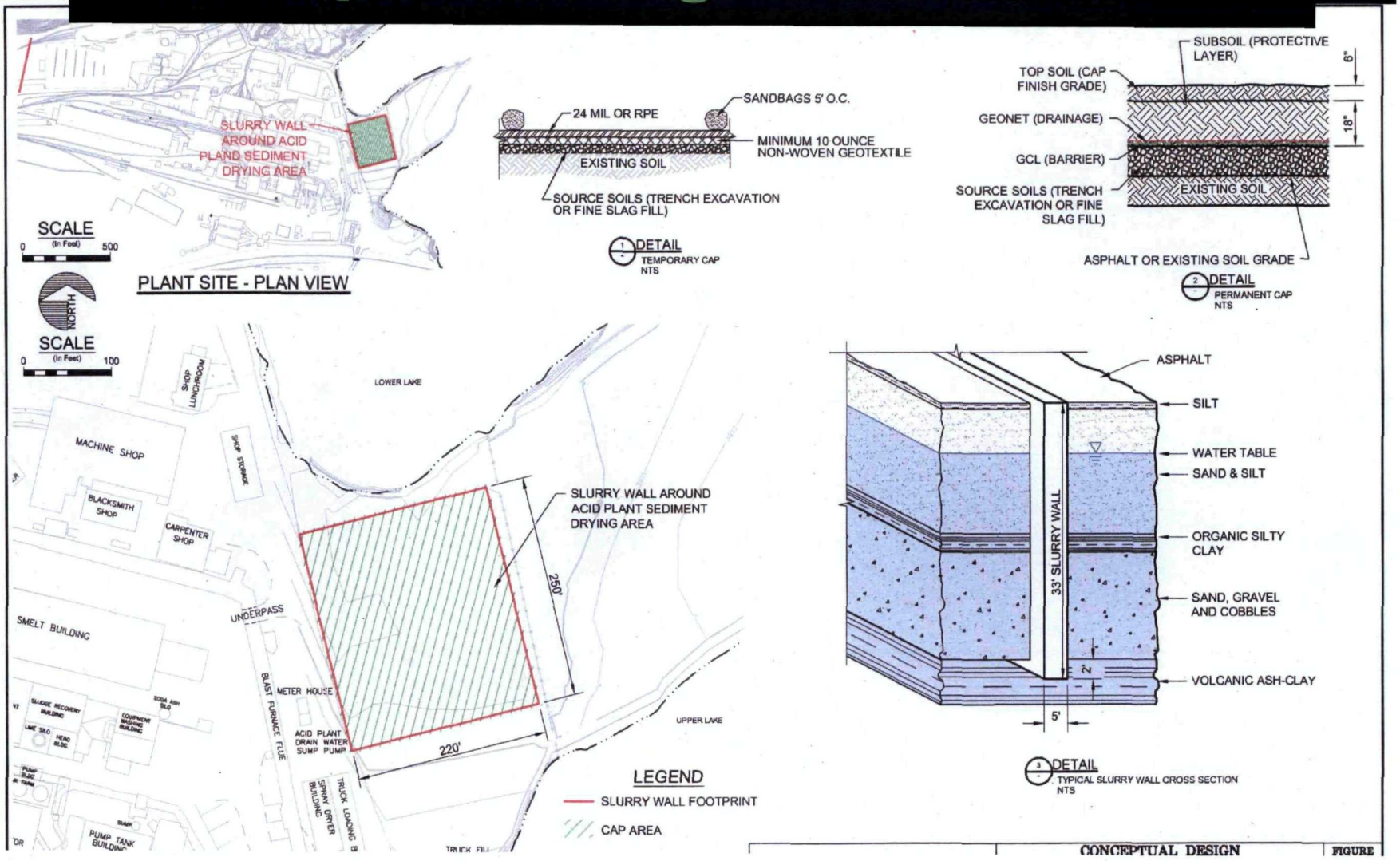
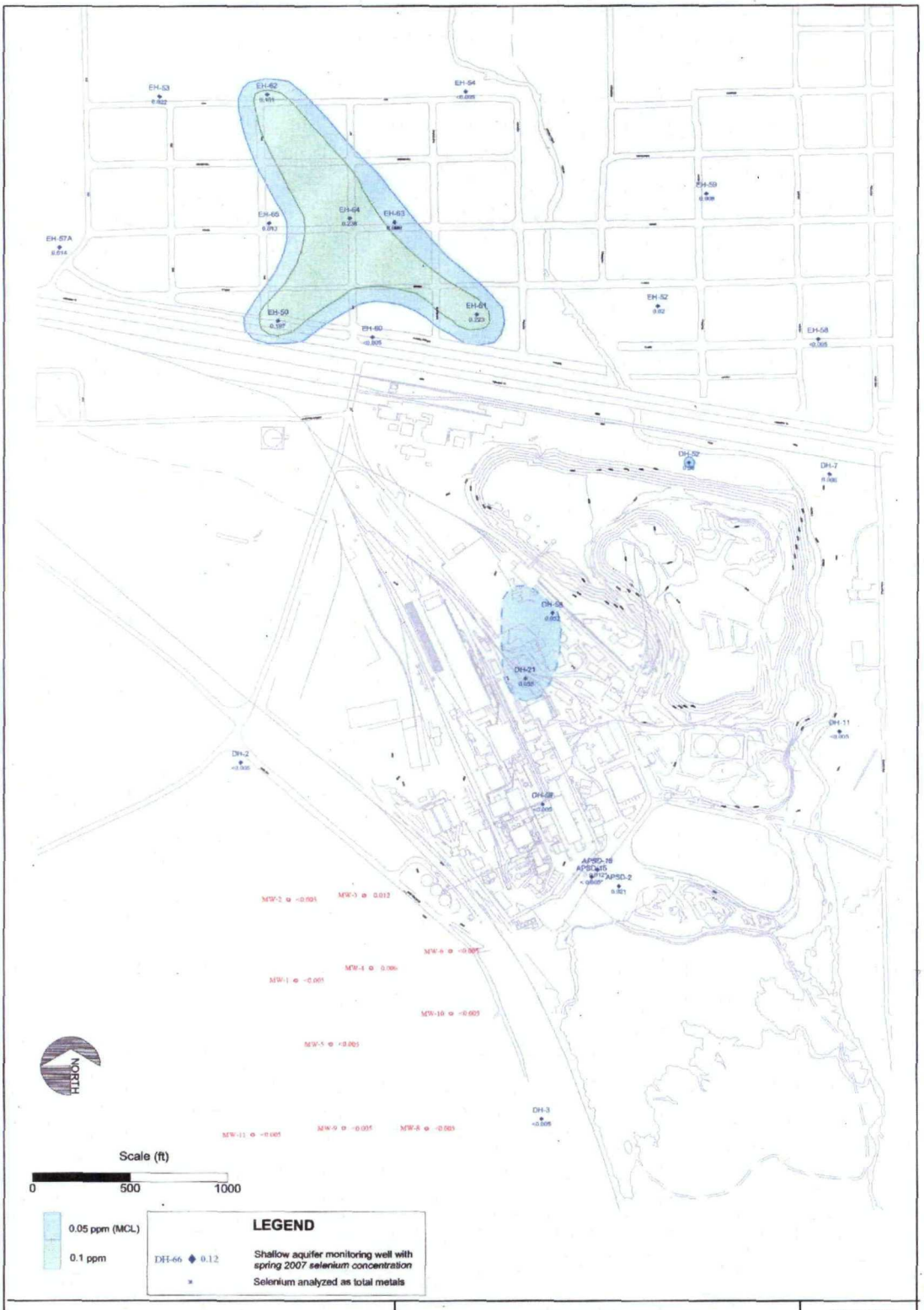


Figure 10 Slurry Wall and PRB Locations

Figure 11. Slurry Wall and Cap Conceptual Design





Selenium Plume Map
Shallow Aquifer May 2007

FIGURE

7

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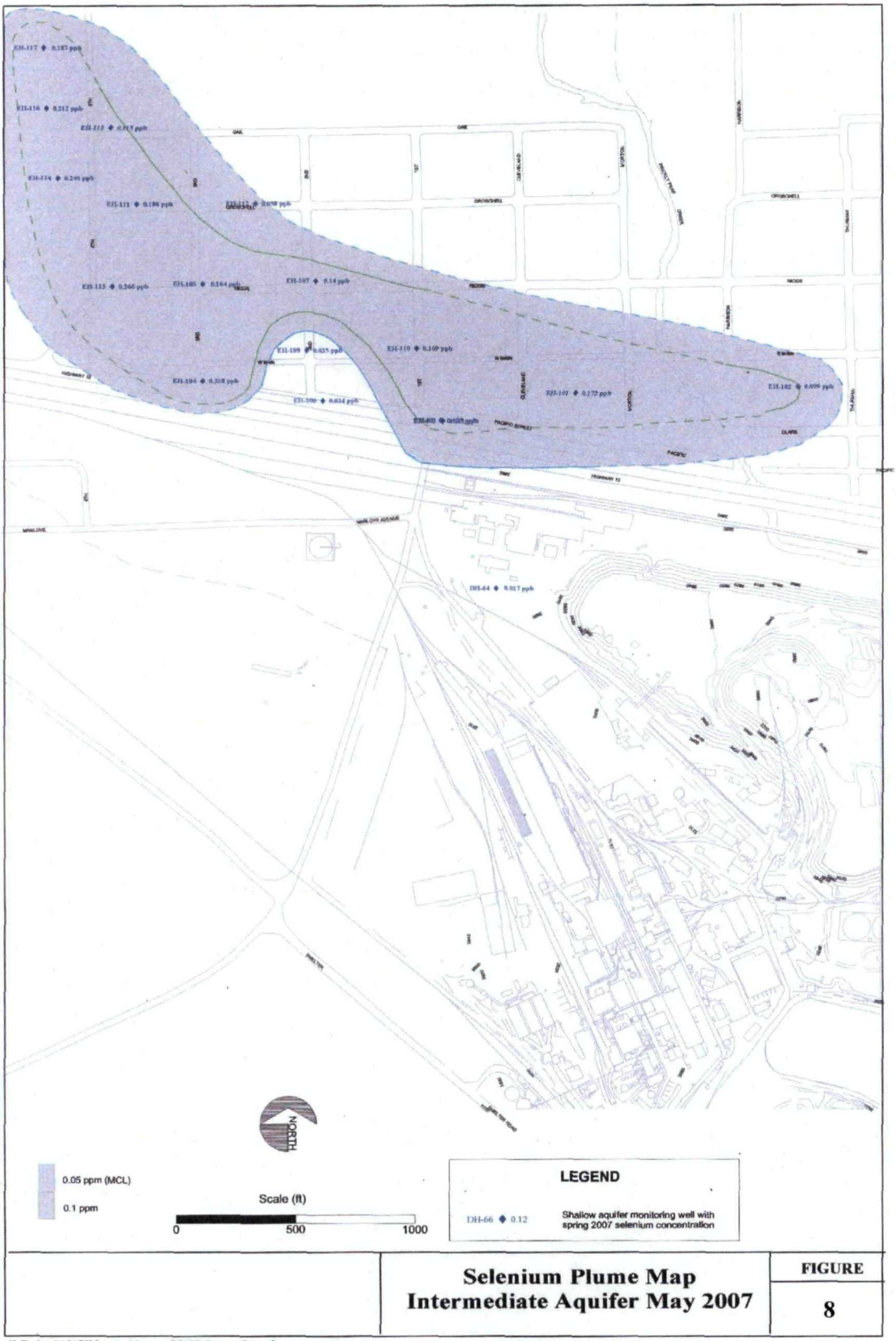

Selenium Plume Map
Intermediate Aquifer May 2007

FIGURE
8

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